

REMARKS

Claims 2-11 are pending.

Claim 1 has been cancelled.

Claims 2-10 have been amended so as not to depend upon cancelled claim 1.

The specification has been amended to correct typographical errors, i.e., from “schrenk” to “schlenk.”

No new matter has been added by way of the above-amendment.

[I] Election of Species

Applicants request clarification as to the extent the Examiner has searched the claimed subject matter. As the Examiner will recall, in the January 25, 2006 Amendment, Applicants elected the species of Example 1 which is not a star shaped structure.

On the one hand the Examiner indicates that the Election of Species is made final which implies that the Examiner has not extended the search to include star shaped structures. However, on the other hand, the Examiner applies references which the Examiner alleges teach star shaped structures.

Has the Election of Species requirement been withdrawn?

[II] Priority Documents

The Examiner is respectfully requested to acknowledge receipt of the instant priority documents in the next communication from the Examiner.

III Issues under 35 USC 112

Claims 1-11 are rejected under 35 USC 112, second paragraph for allegedly being indefinite. Applicants respectfully traverse the rejection.

The Examiner has taken the position that the terms "polar" and "nonpolar" are indefinite. Applicants respectfully submit that the terms "polar" and "nonpolar" are well known in the art and Applicants have not used these terms in an inconsistent manner with the art recognized definitions.

The term "polar polymer" in claims 1-11 in the present invention is defined as a polymer which have a polar segment, and is obtained by homopolymerizing or copolymerizing various polar monomers. (See page 3, second paragraph in the description of the present invention). Same or similar definition sometimes appeared already in the published articles and patent such as:

- 1) K. Matyaszeewski et al., *Journal of Macromolecular Science Part A - Pure and Applied Chemistry*, Vol. A39, No. 9, pp. 901-913 (2002);
- 2) T. Matsugi et al., *Journal of Polymer Science: Part A: Polymer Chemistry*, Vol. 41 3965-3973 (2003);
- 3) Y. Inoue et al., *ibid.*, Vol. 42. 496-504 (2004); and
- 4) WO 03/078317A (Applicant; Carbon Nanotechnology, Inc).

Also, the website http://en.wikipedia.org/wiki/Chemical_polarity#Polarity_of_molecules (August 7, 2006) defines "Polarity of molecules" as follows:

A compound is comprised of one or more chemical bonds between atoms. The polarity of each bond within the compound determines the *overall polarity* of the compound: how polar or non-polar it is. A polar molecule contains polar bonds - bonds which have unequal sharing of electrons between the two atoms involved in bonding. A non-polar compound contains non-polar bonds - bonds which have identical or similar sharing of electrons.

However, a compound's symmetry and net polarity must also be considered when determining the polarity of the overall molecule. Even if a compound contains only polar bonds, it may be non-polar overall as the direction of the polarities cancel each other out, giving the molecule a net polarity of zero. This occurs in boron trifluoride, which contains three identical polar bonds all cancelling each other out due to their symmetrical arrangement. Trigonal planar, tetrahedral and linear bonding arrangements often lead to symmetrical, non-polar molecules which contain polar bonds.

Accordingly, the terms "polar" and "nonpolar" are art-recognized and do not render the claims indefinite as alleged by the Examiner.

The Examiner also alleges that claim 7 is indefinite since the formulae V-VII in claim 7 is undefined. Applicants have reviewed claim 7 and are unclear why the Examiner makes this rejection. Applicants note that the formulae V-VII reside in claim 5 and not 7. In any event, it appears that the formulae are properly defined.

Regarding the second point the Examiner raised in his rejection, we believe strongly that respective substituents of the formula V -VU in claim 5 (not in claim 7) are properly defined.

In view of the foregoing, Applicants respectfully submit that the claims, as currently amended, clearly point out and distinctly claim the subject matter of Applicants' invention, and as such, the requirements of 35 USC 112, second paragraph have been satisfied. Withdrawal of the rejection is respectfully requested.

[IV] Issues under 35 USC 102(b) and 103(a)

The Examiner issues the following rejections against the pending claims:

(1) Claims 1-11 stand rejected under 35 USC 102(b) as being anticipated by Matylaszewski '473 (D1);

(2) Claims 1 and 5-11 stand rejected under 35 USC 102(b) as being anticipated by Saito et al '414 (D2);

(3) Claims 2-4 stand rejected under 35 USC 103(a) as being unpatentable over D2 in view of Wunsch '866 (D3) or Stephens '454 (D4);

(4) Claims 1-11 stand rejected under 35 USC 102(b) as being unpatentable over Janssen et al '542 (D5);

(5) Claims 1-11 stand rejected under 35 USC 102(e) as being unpatentable over Kennedy et al '354 (D6); and

(6) Claims 1-11 stand rejected under 35 USC 102(e)/103(a) as being unpatentable over Kennedy et al '022 (D7).¹

Applicants respectfully traverse the rejections.

In support of the various rejections, the Examiner takes a broad view of the scope of the respective (P¹), (P²), (P³), (P⁴), (P⁵), and (P⁶). However, Applicants note that the inventive multi-branched polymer has *multiple* (P) segments.

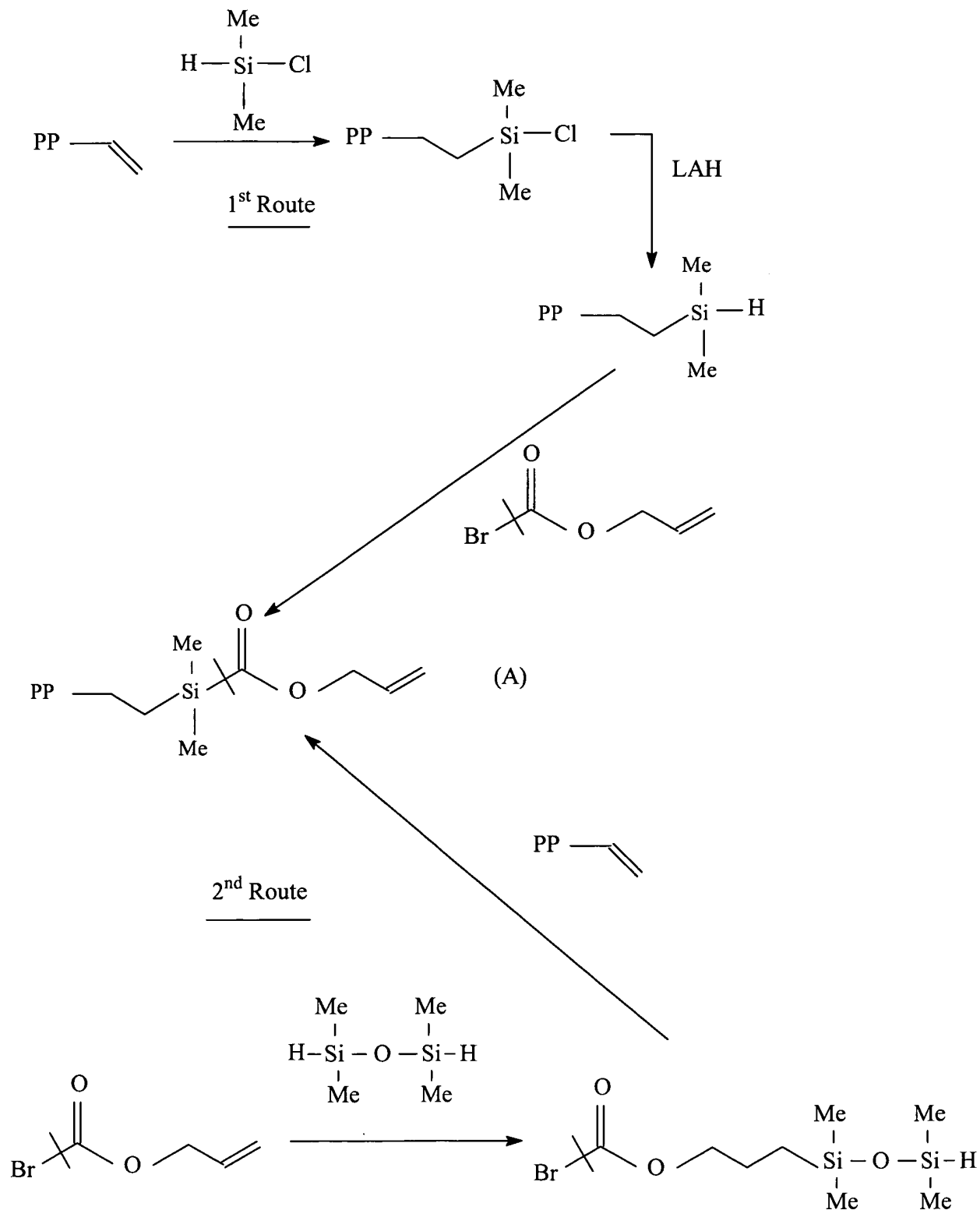
As the MPEP directs, all the claim limitations must be taught or suggested by the prior art to establish a prima facie case of anticipation or obviousness. See MPEP §§ 2131 and 2143.03. Applicants respectfully submit that all of the claim limitations are neither taught nor suggested in any of D1-D7.

¹ D1; US200210183473A [Matyjaszewski]
D2; US4292414 [Saito]
D3; US6162866 [Wunsch]
D4; US6759454 [Stephens]
D5; EP0856542 [Janssen]
D6; US2003/0236354A [Kennedy]
D7; US2003/0204022 [Kennedy]

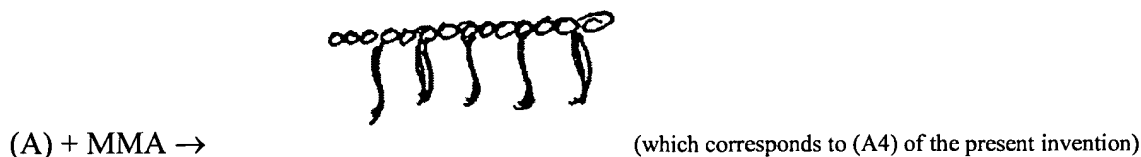
[IV-A] D1:

Based on the Examiner's comments in the outstanding Office Action, the Examiner appears to be relying upon claim 11 of D1 and paragraph 231.² In the paragraph 231 of D1, it is disclosed that "Two approaches were taken for the preparation of a propylene based macroinitiator for the ATRP copolymerization of a polypropylene macromonomer with MMA." (Wherein "ATRP" represents atom transfer radical polymerization.) However, the graft polymer thus produced is roughly equivalent to only a segment (A4) of the present invention, namely a polar polymer chain having polyolefin side chains. The Examiner's attention is directed to the reaction scheme written in D1, paragraph 231-257, which is as follows:

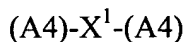
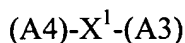
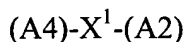
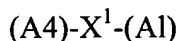
² The Examiner mentions paragraph 230 in the outstanding Office Action, but quotes from paragraph 231.



Then (A) is reacted with MMA in a ATRP reaction as follows:



This polymer of D1 essentially corresponds to (A4) of the present invention, however, the polymers claimed in instant claims 2-11 are not as simple as just structure (A4). The polymers of claim 2 must have other structures attached thereto, e.g., the block or graft structure of claim 2 must have at least one of an ester, amide or ether group (for X^1) and be bonded to P^3 (wherein P^3 is a polymer chain having a number-average molecular weight (M_n) of 500 to 1,000,000, selected from a polyolefin chain (A1), a polyolefin chain having polar polymer side chains (A2), a polar polymer chain (A3) and a polar polymer chain having polyolefin side chains (A4)). In other words, the polymers of claim 2 (and several dependent claims) are one of the following candidates:



The Examiner will note that D1 fails to teach or suggest such structures as recited in claim 2 (or any of claims 3-11 for that matter).

Furthermore, the Examiner will note that whether the 1st Route or the 2nd Route of D1 is performed, that the backbone of the final polymer must have a silicon atom incorporated therein.³ This is in distinction to X^1 in the present invention which is a linking group containing

³ The Examiner will note that Scheme 4 on page 9 of D1 has a typographical error, i.e., the final polymer should have a silicon atom in the polymer backbone.

less than 200 atoms in total and containing a group selected from an ester group, an amide group or an ether group.

Furthermore, the Examiner's attention is directed to claim 11 in D1 which describes a polyolefin as a macromonomer.

Accordingly, significant patentable distinctions exist between the present invention and the teachings of D1.

[IV-B] D2, D3 and D4

In view of the cancellation of claim 1, Rejection (3) which is based upon D2 is rendered moot. Applicants now discuss the combination of D2, D3 and D4 as applied in Rejection (4).

Applicants respectfully submit that the claims are distinguished from D2, D3 and D4, since these references teach that vinyl aromatic monomers and conjugated diene monomers are essential monomers for the preparation of the modified block copolymer. However, the Examiner will note from the specification that vinyl aromatic monomers and conjugated diene monomers are not used for the preparation of the inventive multi-branched polymer.

Accordingly, significant patentable distinctions exist between the present invention and the teachings of D2, D3 and D4.

[IV-C] D5, D6 and D7

With respect to reference D5, the only example on page 27 uses tetramethyltetravinylcyclotetrasiloxane as the central linking group. The Examiner will note that this central linking group does not have:

- i) at least two ether moieties,
- ii) at least two ester moieties, or

- iii) at least one ether moiety and at least one ester moiety as required by X² of claim 3; or
- iv) halogen atom,
- v) a hydroxyl group,
- vi) a carboxyl group,
- vii) an acid halide group,
- viii) an amino group,
- ix) an epoxy group, or
- x) an isocyanato group as required by X³ of claim 4.

Accordingly, D5 does not anticipate the presently claimed invention.

With respect to references D6 and D7, both these references require the use of polyisobutylene. However, the Examiner will note from the specification that polyisobutylene is not a part of the inventive multi-branched polymer.

Accordingly, significant patentable distinctions exist between the present invention and the teachings of D5, D6 and D7.

Based on the foregoing, withdrawal of Rejections (1)-(6) are respectfully requested.

In view of the above amendment, applicant believes the pending application is in condition for allowance.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Garth M. Dahlen, Ph.D., Esq. (Reg. No. 43,575) at the telephone number of the undersigned below, to conduct an interview in an effort to expedite prosecution in connection with the present application.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to our Deposit Account No. 02-2448 for


Application No. 10/797,144
Amendment dated August 7, 2006
Reply to Office Action of April 5, 2006

Docket No.: 1188-0118PUS1

any additional fees required under 37 C.F.R. § 1.16 or under § 1.17; particularly, extension of time fees.

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Respectfully submitted,

By 

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